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The Comparative Cost of Soda Ash and Salt Cake in the Manufacture of Window Glass

By J. B. KRAK

On November 28, 1921, soda ash was selling at $29.00 a ton and salt cake at $21.00. Would it pay to substitute salt cake for soda ash on the basis of these quotations?

The reaction between soda ash and sand during the melting process is as follows:

$$\underset{\text{Soda ash}}{Na_2CO_3} + \underset{\text{Sand}}{SiO_2} = \underset{\text{Sodium silicate}}{Na_2SiO_3} + \underset{\text{Carbon dioxide}}{CO_2}$$

The molecular weight of soda ash is 106. Of this amount 62 parts enter into combination with the sand and 44 parts are driven off as carbon dioxide gas. If the soda ash is 99% pure it takes $\frac{106}{99} \times 100 =$ 107 parts of soda ash to produce 62 parts of sodium oxide. The cost of 62 tons of sodium oxide from soda ash is therefore 107 × $29.00 = $3,100. The cost of one ton of sodium oxide from soda ash is $50.60.

J. B. KRAK

Graduate, Fresenius' Laboratory '07. Bachelor of Science, West Virginia University '12. Formerly Chemist, West Virginia Geological Survey, and Consulting Chemist, United States Window Glass Company. Technical Editor of THE GLASS INDUSTRY.

The reaction between salt cake, sand and coal is as follows:

$$\underset{\text{Salt cake}}{2Na_2SO_4} + \underset{\text{Coal}}{C} = \underset{\text{Sodium sulphite}}{2Na_2SO_3} + \underset{\text{Carbon dioxide}}{CO_2}$$

$$\underset{\text{Sodium sulphite}}{2Na_2SO_3} + \underset{\text{Sand}}{2SiO_2} = \underset{\text{Sodium silicate}}{2Na_2SiO_3} + \underset{\text{Sulphur dioxide}}{2SO_2}$$

From this equation it follows that in order to obtain 62 parts of sodium oxide, 142 parts of salt cake are required, and 64 parts of sulphur dioxide and 22 parts of carbon dioxide are expelled as gases. If the salt cake is 95% pure, it takes $\frac{142}{95} \times 100 = 149.5$ parts to produce 62 parts of sodium oxide. The cost of 62 tons of sodium oxide from salt cake is therefore 149.5 × $21 = $3,139.50. The price of one ton is $50.60, being 60 cents per ton higher than if derived from soda ash. The expense of the coal must be added to this figure.

Another advantage of soda ash over salt cake is the fact that the output of finished glass per 24 hours for the same tank is greater when soda ash is used. This can be explained when it is considered that less gas has to be expelled in the case of soda ash. From the foregoing calculations it follows that 44 parts of gas are driven off for every 62 parts of sodium oxide derived from soda ash. An equivalent amount of salt cake yields 86 parts of gas. Moreover, it requires more heat and a higher temperature to effect the combination of salt cake, coal, sand and limestone. A salt cake batch is more corrosive than a soda ash batch. Repairs are less frequent and the life of the tank is longer when soda ash glass is made, the latter also shows less color since salt cake nearly always contains more iron than Solvay soda.

It is clear, therefore, that the use of salt cake is a disadvantage unless the difference in price is considerably greater than in the present market.

It has been observed that a soda ash batch is likely to develop a scum formation. This trouble can be prevented by using a small amount of salt cake, which not only obviates the scum but also causes the glass to become considerably better. Numerous analyses of such glass have shown the presence of about 0.25% of sulphate, calculated as SO_3. Glass made from an all-salt cake batch usually contains about 0.5% SO_3.

The Melting of Glass*

A Discussion Which Took Place at a Meeting of the Society of Glass Technology on November 16, 1921, at Leeds University

The first question dealt with was couched in the following terms:—"We are interested in the casing of opal on flint glass. We believe that trouble is at times found in the cracking of the glass after manufacture. What are the special points to be observed so as to carry out the process successfully?"

The member who had submitted this question mentioned that his firm had been endeavoring to make a flint-and-opal glass, but up to now they did not appear to have been able to arrive at the correct coefficient of expansion between the two metals. The matter had been referred to Prof. Turner at Sheffield University, who was already engaged in some research work in connection with it. A sample of the sort of trouble experienced had been brought to Leeds, and although it was not produced a description of it was given. It was stated that the opal casing cracked away from the flint, leaving a gap of nearly a quarter of an inch without the piece actually fracturing. Moreover, the opal casing was dulled in the firing, but it was, of course, necessary to attain to a brilliant surface.

Dr. Travers was asked to reply to this question. He recalled that during the war he was actively identified with the manufacture of light hollowware. He was specially interested, therefore, when he visited the United States some time ago in the glassworkers' methods over there. While in the States he paid particular attention to the Bohemian method of producing this type of ware. He spent many hours watching the men making this light hollowware, including opal-cased globes. One point that struck him particularly was that the men worked at very large chairs; each man had a very restricted task to perform, and discharged it with great exactitude. The men were all highly skilled, but each operated in a very limited field. In the case of a flint globe with an opal casing, he noticed that the first man merely gathered the ball of flint, and this performance was speedy and accurate. He handed it to the second man, who covered it with opal very evenly and with equal rapidity. Upon the exactitude and speed of these first two operations all further success depended. Upon a perfectly even covering of the clear flint by the opal depended uniformity of light, as well as uniformity of stress all over the surface. There must be no serious differences of contraction, however, between the two glasses. If the coefficients of the two glasses differed markedly, naturally they would refuse to stick together. There was a very old and well-tried method of testing whether or not two glasses had the same coefficient of expansion, viz., one that was described in the last number of the Society's *Journal*. Two rods of glass were heated up and welded together. A thin strip of glass was obtained by pulling out the welded portion with forceps, the two glasses thus forming opposite sides of the strip. If the strip were now allowed to cool, it would bend towards the glass having the higher total expansion up to the softening point of the softer glass. A very slight curvature would indicate that the two glasses would weld together without subsequent fracture if well annealed, whereas an appreciable curvature would seem to show that the two glasses could not satisfactorily be used in combination. The manufacture of flint-and-opal glass was very largely a matter of trial and error, but he thought a good many of the difficulties might be overcome by adopting careful and active methods of working.

PROF. TURNER said that he thought the chairman had broadly covered the ground. He was of the opinion, however, that the casing of one glass by another was more or less possible even where there was a certain amount of deviation of expansion. The degree of relative softness of the metals—the plasticity if one liked so to call it—played a certain rôle. Some glasses might be disposed to give way much more than others. A lead glass, for instance, was particularly suitable for casing purposes. The question at issue was not only bound up with the coefficient of expansion of the flint and opal glasses, but also with the softness of the glass; and a lead glass, being softer than a calcium-containing glass, helped towards a balance of the respective coefficients. He fully agreed with the chairman that the active working of the metal was as important a consideration in connection with the casing of glass as any.

MR. J. H. DAVIDSON mentioned that he also had been engaged in the working out of an opal-and-flint glass, and in the course of his experiments he had experienced as bad a case of cracking as it was possible to conceive. He agreed with Dr. Travers that it was largely a question of trial and error, and he might add that, by taking some of the figures for cryolite and feldspar given by Schott, glasses had been worked out which seemed to agree very well. Increased cryolite gave a distinct decrease in the expansion of the opal glass. One rather curious point had, however, arisen. They had attempted to make a thermometer glass with a white line, but when the cylinder was marvered out with the white line underneath, and this was drawn out to a length of forty or fifty yards, the white line seemed to creep round somehow. It was at the bottom at the punty end and also at the bottom at the flow iron end, but in the middle of the sagging rope of glass tubing the white line crept round, until, when it got to the center, it was almost at the top. The line was perfectly straight at both ends, but curved round in the middle of the rods.

THE CHAIRMAN observed that this might be due to draft chilling. MR. DAVIDSON replied that while this might be one explanation—indeed, that solution had already occurred to him—he could hardly understand why the white line curled round in the center and there only.

Two other questions which were taken together, were:—

(1) "What effect has the weight and volume of batch filled on, and the period of time elapsing between fillings, upon the rate and efficiency of melting?"

*From *The Pottery Gazette and Glass Trade Review.*

(2) "Which is the better practice to adopt in filling on batch in a glass tank—to fill on a large quantity at considerable intervals, or small quantities more frequently?"

In connection with these two questions, PROF. TURNER communicated to the meeting the opinions of Mr. R. L. Frink, to whom the matter had been referred. In effect, these opinions were as follows:—

The weight and volume of batch that is filled on to a tank furnace has a decided effect upon the efficiency of melting, both from a fuel point of view and a quality standpoint. Assuming that two or three tons of batch are filled on in one charge, it is obvious that the temperature of the furnace must be greatly reduced, as a greater quantity of gases will be evolved from the batch, with the result that a greater quantity of gases having a lower temperature will pass through the checker work or the regenerators. As the temperature is reduced the draft decreases, and because of the increased volume of gases and the decreased draft there ensues a retardation of, and a consequent decrease in the volume of, the air supply. The result is that the rate at which the batch is melted is decreased, and that those components of the batch which melt at lower temperatures will become, to a more or less degree, segregated, or at least striated, within the surrounding glass. It also follows that if the regenerators or recuperators on that side of a furnace from which gases are issuing become lower in temperature, and if the volume of the regenerators is insufficient to meet the requirements, that particular side of the furnace will remain colder for a longer period of time. Consequently, for some time the furnace is unbalanced in its combustion, and unequal melting will take place. This obviously will affect quality. Again, as the color of the glass depends upon the draft and the combustion, it follows that there are likely to be wide variations in color. Therefore, the amount of batch which has to be filled on in connection with any given furnace, and the period of time elapsing between the fillings, must be determined by the volume of checkers as related to the amount of draft pressure, or velocity of gases passing in within any given periods of time.

Question 2, Mr. Frink observed, was largely answered by Question 1. In pot furnaces, however, his experience led him to believe that to obtain the best results and the maximum efficiency the first filling on should not exceed one-third of the capacity of the pot. The second filling should be made to "fill" the pot to substantially two-thirds of its capacity, and the third filling should be sufficient to fill the pot completely. In pot practice he preferred to mix the cullet with the batch, the cullet being ground to pass a 1½ in. screen. He did not agree that the cullet should be ground so as to pass a ½ in. screen. In tank practice there should be a first filling of 25 per cent. cullet, the batch afterwards being filled in upon this foundation. In this manner a platform would be afforded upon which to build up the batch materials into the fire, submitting them to a greater volume of air and therefore to a higher temperature, and also permitting the escape of the gases.

DR. TRAVERS submitted that the common practice when dealing with pot furnaces was to charge as much material into the pot as it would conveniently hold. Just how much that was would depend very largely upon the nature of the glass. In the event of the glass being frothy the second filling might have to be sparse.

A MEMBER hereupon suggested that the sort of information that was required was not in terms of small or large quantities, but what actually would be the amount in the case of, say, a 40-ton tank? What would be the best standard practice?

DR. TRAVERS replied that in this matter they were dealing with a problem which affected a large number of the Society's members who were working tank furnaces of varying capacities. It had already been decided that a number of experiments should be carried out, based upon different fillings at different periods of time. Careful records would be taken, and an attempt would be made to deduce from these records the best averages. The results would be communicated later. What the Society was anxious to obtain was reliable data, founded upon carefully recorded tests and experiences.

MR. F. W. ADAMS gave it as his opinion that in dealing with an automatic tank furnace, yielding 30 tons of glass per day, the best practice was to fill on continuously. As long as ever they were pulling out they ought to be feeding in. The only respite that they allowed at their works in the matter of filling on was during the period that the men took their meals. They followed the practice that Mr. Frink suggested, viz., filling on 25 per cent. cullet, and then building up the batch upon this foundation.

MR. J. CONNOLLY said it was also his experience that the charging in of small quantities at regular and frequent intervals was preferable to more infrequent and heavier charges. He had seen a charge thrown right across the surface of the tank—a practice which caused damage both to the color of the glass and the brickwork. He was convinced, from personal experience, that continuous feeding at short intervals resulted not only in the production of a glass of better color, but also in a saving of fuel.

MR. G. SIMPSON observed that at one time they used to fill on every four hours, but they found that it took very considerably longer to melt the glass than when they filled on, as was now the practice, a smaller quantity every hour or half-hour.

MR. CONNOLLY: "When we were over in the States we noticed that the bulk of the firms filled on every twenty minutes or so."

"Is it not largely a matter of the type of furnace with which you are dealing?" asked another member. "From a dog-house you can charge on large quantities without much difficulty, whereas, with an ordinary furnace there would be a lot of cold air entering the furnace every time the operation is performed."

MR. J. ADAMSON expressed the view that in an open tank without a bridge, large fillings would be better than small ones.

MR. G. SIMPSON: "The answer to that point is: Put a bridge in."

MR. J. ADAMSON: "I have tried both."

PROF. TURNER said it could not be ignored that the human element still subsisted in a good many factories. Boiled down, the whole question seemed to resolve itself into whether a dog-house should or should not be employed. The

inference to be drawn from what had been said was: by all means have a dog-house. He was not unaware that this question of how much should be charged on, and how often, was frequently made a matter of the convenience of the people who were doing the founding. Very often the practice had been as follows:—When the charge was about to be put on, all the gases were turned down, or the pressure reduced, which meant that instead of having a positive pressure inside the furnace there was a negative pressure. The result was that through the charge hole, which was now wide open, as well as through the working holes, there streamed in currents of cold air, which brought down the temperature. The question that had to be decided was, whether a greater benefit was obtained by putting on a large quantity and being content with slower melting, while having only one bad effect of cold air to contend with, than by having more rapid melting in smaller quantities but with greater frequency. The only conclusion that he could come to was, as he had said, install a dog-house. He might mention that he was in a factory only three or four days previously where a dog-house had been added to an existing furnace. The cold air difficulty had been entirely dispensed with, and the owner of the factory averred that this had been his salvation. The tank, which was only a small one of about six to eight tons capacity, was now being charged on at half-hour intervals, and they were getting a continuous supply of glass—much larger than they had ever had previously. They now had an automatic machine, and all the chairs were going.

Some further discussion on this subject took place, and eventually this was brought to a close by DR. TRAVERS, who, summing up, said that he thought glass furnaces were very much like steam engines. In their operation quite a number of factors had to be considered, all of which were interdependent. The discussion would, he thought, serve a useful purpose, even though there was not time just then to continue it to a further stage.

Production of Arsenic in 1920

Although there was a noteworthy increase in the production of arsenic in 1920, only about the usual quantity was consumed at glassworks, the great increase in output being caused by the demand from manufacturers of weed-killers and insecticides. Total sales in the form of arsenious oxide in 1920 amounted to 11,502 short tons valued at $2,021,356, compared with 6,029 tons in 1919, estimated at $1,181,684 in value.

The five plants producing crude and refined trioxide in 1920 were the American Smelting & Refining Company's plants at Globe, near Denver, Colo., at Tacoma, Wash., and at Perth Amboy, N. J., the plant of the Anaconda Copper Mining Company at Anaconda, Mont., and the United States Smelting, Refining & Mining Company at Midvale, Utah.

Price quotations on white arsenic in 1920 ranged from 10¼ cents a pound at the beginning of the year to 18 cents in the middle of June, declined to 13½ cents in August, rallied to 15 cents in September and then declined to 10½ cents in December.

The railroad freight rate on crude or white arsenic from Denver to New York or all points east of the Ohio-Pennsylvania State line at the end of 1920 was $18.86 a ton in barrels or casks for a minimum of 50,000 pounds; the rate from Salt Lake City was $20, and from Seattle or Tacoma $25. The Pacific Mail Steamship Company and the Matson Navigation Company, which operate freight steamers to Baltimore, furnished a rate on crude and refined arsenic in barrels at 60 cents a hundred pounds in shipments of not less than 60,000 pounds.

The above information is taken from a report on Arsenic in 1920, by Victor C. Heikes of the United States Geological Survey, who stated that arsenic plants situated near the seaboard have the advantage of those in the interior, and that unless other arsenical products, such as insecticides and weed-killing compounds, are made at the interior plants, it may be difficult for them to compete with foreign arsenic in the future.

Design of Atmospheric Burners

The Bureau of Standards has carried on an extensive investigation of gas burner design intended primarily for the benefit of manufacturers of gas appliances and industrial gas appliance engineers. The results of this work are given in Technologic Paper No. 193 of the Bureau of Standards which is now for sale by the Superintendent of Documents, Washington, D. C.

In this paper no extensive presentation of theory has been attempted, the aim being rather to show by means of tables and curves based on experimental data the effect of various factors on the operation of burners. With the arrangement of apparatus and method of testing that has been developed, it is possible to measure quickly and accurately the volume of air injected into any burner under any condition of operation, as well as to determine the limits of operation with any quality of gas. Such information is essential in order to determine the limits of operation with any quality of gas. Such information is essential to enable one to design burners for any predetermined condition of operation. In order to understand the various factors entering into the design of burners, it was found necessary to study the theory of the flow of gas through different types of orifices, the principles governing the rate of injection of air into the burner, the design of the injecting tube, the rate of consumption of burners of different port areas, and the effect of adjustment of the air shutter. These various factors are taken up in detail in the paper referred to above.

In conclusion it is pointed out that on account of its simplicity, low cost and reliability, the atmospheric gas burner is well adapted for domestic and most of the smaller industrial purposes. If it is possible to widen the range within which such burners can be operated efficiently and without adjustment and design them to meet the needs of any particular purpose, it will make gas fuel much more valuable and will broaden its field of application. With this in view, the Bureau has been conducting experiments on atmospheric burners both with natural and artificial gas and the results will be reported in subsequent papers.

Producer Gas Plant Design

By R. F. CLEWELL*

(*Written for* THE GLASS INDUSTRY)

(*Continued from December*, 1921)

SELECTION OF EQUIPMENT

After having selected the location for the gas plant and decided upon the tonnage of coal to be gasified the next important consideration is the selection of suitable and adequate equipment.

One of the first impressions received by those to whom the installation of producer gas equipment is a new undertaking is that the first cost is tremendous and this very fact often works great harm to the installation. The thought uppermost is to cheapen the design in order to suit the sum to be expended regardless of final results. The only thing to be said of this policy is that in the end it will prove a very costly one.

Even though the first cost of an installation may be seemingly high, the real question to be considered is what return will the investment bring. And it is not infrequently the case that a modern well designed producer gas plant will pay large dividends when replacing old equipment, or when producer gas is used to replace natural gas or oil as furnace fuel.

It is necessary, knowing the quantity of coal to be gasified, to choose the type of producer best suited for the service. If the tonnage is large, say over 100 tons per day (24 hours), one or another of the high capacity mechanical type producers should be chosen, if the tonnage is under 100 but in excess of 35 or 40 tons per day, then an installation of semi-mechanical producers would perhaps be the best choice, while for less than 35 tons per day either hand-poked or semi-mechanical producers should be used.

The question of choosing any one of the three types of producers is not one which can be answered definitely as the adaptability of each type overlaps the other. It would be well, however, to keep in mind these facts when making the selections: (1) It is not good practice to install one unit of any type of producer. Always arrange the installation so that it will consist of at least two producers or preferably three or four, unless as mentioned before, the single unit is the first of a battery, which will eventually be installed. (2) It is also not good practice to extend the installation out into a large number of small units when by the substitution of units of larger capacity the number could be reduced, for the greater the number of units the higher the operating cost. It is of course true that the fewer units used in the installation the less expensive the housing, coal handling and gas mains will be, but if this is carried on down to the single large unit where these three items become a minimum, then it is possible that these apparent economies may be offset by disadvantages encountered in a one producer installation. The principal disadvantages experienced in a single unit plant are: (1) Lack of reserve capacity; (2) any upset of fire conditions, causing poor gas quality, is felt immediately at the furnace; (3) a breakdown on the single producer causes a complete shutdown.

On the other hand, if the installation is composed of several units, there can always be available, if wisely the plant has been so designed, sufficient reserve capacity to enable a certain amount of manipulation on one or another producer in case it is necessary to improve a bad fire or otherwise administer corrective measures. When, for any reason, one of several producers requires repairs of any importance, necessitating a shutdown, it is a matter of only a few minutes to cut it off the line and, if the equipment has been wisely selected, it will be possible to force the remaining units to carry the load until the trouble can be overcome. These considerations are of real importance although it is an easy matter to ignore them as unimportant until repeated trouble and shutdowns impress the fact more forcibly than it is possible to do it here, and the remedy is beyond reach or procurable only at far greater expense than would have been necessary at the outset if proper thought had been given to this point.

We will assume that the units of proper size have been selected and the question now is one of selecting from the variety of producers on the market, the one which will perform the service most satisfactorily. It is customary, when making this decision, for someone to visit installations of producers in operations for the purpose of making a study of their adaptability to the service they will be required to perform. This is a very good method and enables the prospective user to secure some first-hand information regarding the operation and maintenance of the various producers in general use. Regardless of how the decision is made as to what class of equipment is to be used, the following questions should receive attention, especially with relation to the mechanical type of producer.

(1) Will the producer operate successfully on the grade of coal to be gasified?

(2) Is the producer a well designed machine in which simplicity is combined with ruggedness, and what of the question of maintenance? Are the maintenance operations simple?

(3) As a mechanical gas machine, is there a minimum of hand labor required in its operation?

(4) What of the class of labor required to operate the producer?

(5) Is the producer better adapted to one class of service than another, or is it well adapted to all classes, and will it stand up well under continuous hard service?

The ability of a producer to gasify successfully a certain grade of bituminous gas coal depends on the physical condition of the coal perhaps more than upon the chemical composition. If in preparing the coal it is possible to screen it and utilize the fines under boilers then as regards its preparation any of the well known mechanical producers

*Standard Manufacturing Company, Corning, N. Y.

will handle it equally well; and also, screened coal considerably improves the operation of hand-poked producers. If, however, the coal contains a very large proportion of dust and fines, which it is not possible to remove by screening because of inability to utilize it to advantage under boilers, then if mechanical producers are used somewhat more satisfactory results will be obtained with a producer which actively stirs the fuel bed. This partial limitation is, however, only true in extreme cases of dirty coal. There is, in fact, quite a marked disagreement among manufacturers as to what amount of agitation a gas making fire should have. It

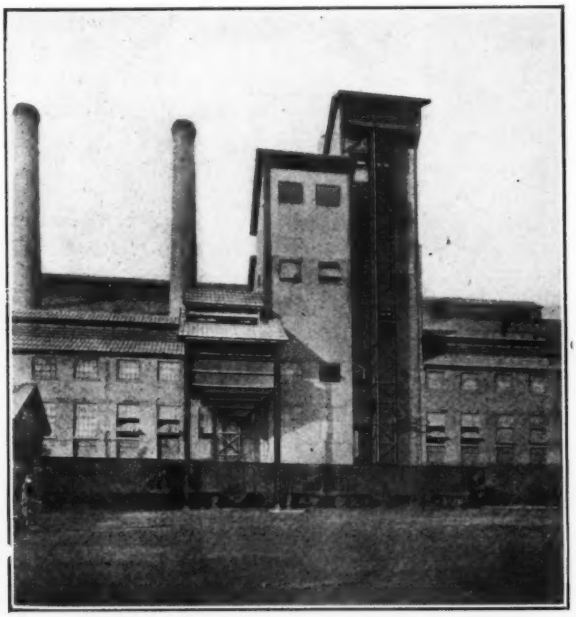


FIG. 3. A TOWER AND SKIP CAR FOR TAKING COAL FROM CRUSHER AND DISCHARGING IT INTO RECEIVING HOPPER

is claimed by some that the fire should be as little disturbed as possible and only the top need be sliced and leveled, while others contend that constant vigorous stirring greatly improves the performance of the producer. In actual performance we find both these theories followed, and in each case good results are obtained.

It is not the purpose here to criticize or compare any equipment and in suggesting the above five questions, they are merely intended to indicate some lines of inquiry which will aid in making a choice.

To a person of a mechanical turn of mind, a simple inspection of any device or machine imparts an impression of either simplicity or complexity, ruggedness or frailty as the case may be and he is either pleased or displeased with what he sees, and these impressions are a good deal like tastes: they vary. In the matter of maintenance, for instance, a good deal depends on the attitude of the person in charge. A question relating to the matter of a certain maintenance operation was recently asked a number of people. The question asked related to the difficulty of the operation and the length of time required in performance. In response, one-third of the answers received described the operation as difficult and the other two-thirds thought it easy. The time required to perform the operation varied from less than an hour to ten hours. This instance is merely cited to indicate that opinions and ability differ widely in matters of this kind, and in securing information upon which to base a decision a first-hand knowledge should be secured if possible; and it should be knowledge, not simply an impressionistic picture. If it is possible for the parties concerned to answer to their satisfaction, as a result of careful study, the five questions outlined above, it should be a simple matter to make a satisfactory selection of a producer to fulfill any specific conditions.

The auxiliary equipment in the producer gas plant equipped with mechanical producers consists of coal and ash handling system, overhead coal bins and regulation for maintaining a constant gas pressure in the mains, together with minor equipment such as motors for drive, steam, water and air piping, and tools. All of this equipment is more or less standard and the only requisite is to make sure that what is installed is of sufficient capacity to supply the requirements of the plant. It was mentioned elsewhere in the foregoing that simple means should be provided to remove the ashes from the plant. Nothing is better for this purpose than a push car under the producers with a skip hoist and bin located outside the plant so that the ashes may be discharged either into a railway car or truck for disposal. The usual method of handling coal from the crusher to the bunkers located over the producers, is by either elevator and

FIG. 4. A MOTOR-DRIVEN LARRY FOR CONVEYING COAL FROM HOPPER TO BUNKERS

conveyor or skip and larry. The latter equipment is very suitable to gas plant service. The usual arrangement, shown in Fig. 3, consists of skip car and tower receiving coal from the crusher, and discharging into a receiving hopper over the main coal bunkers. Coal is drawn from the receiving hoppers into a motor driven larry car, as shown in Fig. 4, which is either a scale car or else a track scale is provided under the receiving hopper and set into the rails which extend out over the main bunkers. The larry travels out over the bunkers discharging its load of from two to five tons of coal each trip and runs back to the receiving hopper. For a small installation where overhead bunkers are used, this same arrangement may be used with a one-ton capacity push car in place of the motor driven car. This arrangement is extensively used in the steel industry in connection with

producer gas installations, where the service is the same as in the glass industry.

In the matter of drive for mechanical producers, it is always best to provide individual motor drive for each producer, rather than attempt to drive a battery of producers from a common line shaft. The tying up of the whole plant to one local source of power is a considerable risk, and reduces the flexibility of the installation to a large extent.

PROVISION FOR FUTURE EXTENSION

Every enterprise however large or small, if properly managed, is reasonably sure to grow as time passes, and

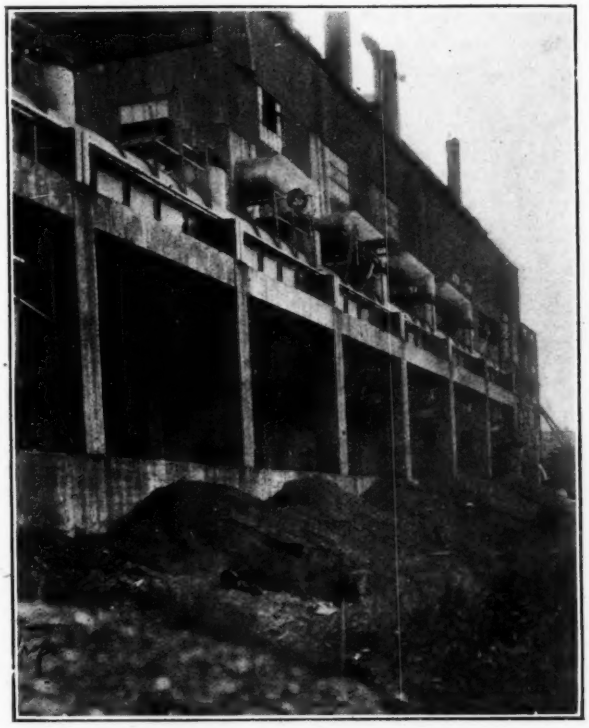


FIG. 5. OFF-TAKE TO GAS HEADER

with growth additional facilities for meeting increased demands will become necessary. It is therefore very unwise to do anything or make any plans without first carefully considering what may be the outlook, say five or ten years hence. We are here considering specifically the designing and construction of a producer gas plant which is to furnish fuel for large scale melting operations.

It is a fact that not so many years ago, when natural gas came to be appreciated as a valuable fuel, and glass plants sprung up extensively throughout the natural gas belt, the procedure followed in constructing a glass plant consisted of building a furnace, covering it with a building and piping natural gas to the furnace, inserting a few simple burners in the ports of the furnace and all was ready to "fill in" and begin making glass. Therefore, the question of fuel was the simplest problem encountered in the whole undertaking, and came to be considered as a matter to be dealt with summarily and forgotten. When the first needs for fuel to replace natural gas began to be felt, the natural consequence was to try in the same way to deal with it summarily and forget it, and in many instances this is the consideration many producer installations have been accorded. It sometimes appears from the way in which producers have been placed in odd corners around a plant, that the chief idea was to hide them, or get them out of the way as much as possible. We may find a single producer, or perhaps two, installed to supply gas to a single furnace. Later on another furnace was constructed, but owing to the cramped quarters or unsuitable location of the first producer installation, no space was available for additional producer capacity, so that the new furnace required a separate producer installation, and further repetition of this method resulted in a number of installations being scattered around the plant, which, of course, required a duplication of operators in each case and spread out and made difficult adequate supervision. In an installation of this sort, while careful thought may have been given to the matter of future requirements as relating to manufacture directly, certainly no thought or very little was given to the matter of fuel supply—it was treated summarily and forgotten—until the next time.

In recent years the question of providing for what may develop in the future has been given more attention than in the past, and wisely; but even in these times we often find a modern producer installation "sewed up" at both ends. This condition may be accounted for very plausibly by the statement that no expansion will ever be required; but unless the present layout of the factory is bounded by immovable barriers on all sides, there is always a possibility that at some future time conditions may warrant an increase of manufacturing facilities which will require additional producer capacity, to obtain which will, if both ends of the plant are blocked by permanent equipment, require either extensive alteration to one end to allow for extension or the erection of another separate plant, either method entailing much greater expense than if the plant had been designed originally with one open end.

The question of providing for future extension should be considered as one of the fundamental principles in the design of any of the primary departments of the glass plant, and the producer installation is one of the most important of these.

ARRANGEMENT AND ACCESSIBILITY OF EQUIPMENT FOR EASE OF OPERATION AND MAINTENANCE

The person engaged in preparing an engineering design for the installation of any kind of mechanical equipment must think constantly of how the plant, when completed, will be operated, and must also be familiar with the necessary maintenance operations and how they will be performed. This is an exceptionally necessary requirement in the design of a producer gas plant. The designer must have a clear picture in his mind of exactly how the producer is operated on the firing floor and on the ash floor. He must be familiar with the necessary incidental operations, such as the "burn-out," and the manner of making the few but important adjustments on the producer, and he should know the relative merits of the various types of coal and ash handling systems and how they will work in to the best advantage under existing conditions. In fact, the designer must be thoroughly familiar with every phase of producer gas construction and not merely make up the design this way or

that way because somebody else did the same, for "somebody else" may have known very little about the matter in the first place.

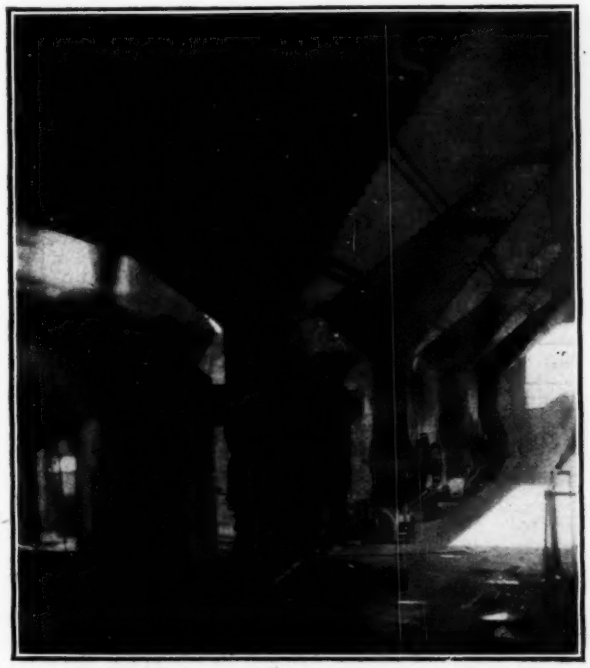
The operation of a producer installation is quite simple but on account of this very simplicity there is apt to be a disregard of the few necessary requirements for good operation, and adequate maintenance, in designing the plant.

Some points of design which should receive the careful consideration of the designer are: Floor space on the firing floor, spacing of producers to permit of easy access to all points under the firing floor, ample provision for light and ventilation in the building, and in sections of the country where the winters are severe, provision should be made for enclosing the plant to prevent freezing of water, air, and dead steam lines. By enclosing the building is not meant the throwing up of a temporary wooden partition during the winter months. This latter practice cuts off all light from the space under the firing floor and makes the necessary operations in this portion of the plant uncertain and hazardous, and makes difficult any necessary maintenance which may be required. Perhaps the maintenance requirements below the firing floor are slight, but when work is necessary at this point it is generally very necessary, and good light and free access will help greatly.

Another important point to be considered is in the arrangement of the gas off-take from the producer. The off-take, or neck, as it is sometimes called, especially when the high rate mechanical producers are used, requires several cleanings during the week in order to remove the deposit of dust and soot, and these periodic cleanings require in most cases a shut down of the entire plant for a few minutes, unless provision has been made which enables this to be done without interrupting operation. However, in any event, whether a shutdown is required or not, it is necessary to provide easy access to all portions of this pipe which connects the individual producer to the common gas header. This off-take for mechanical producers should be so located that its center line is not more than four or five feet above the firing floor at any point, and should be provided with sufficient cleanout doors to allow all portions of the pipe to be thoroughly cleaned. The off-take for hand-poked producers is generally below the firing floor, and the floor over each should be constructed of steel grating and several blow-out holes located in the top of the pipe through which a steam blow pipe can easily be inserted for blowing out the dust accumulation. Another point worthy of attention is the location of the connection of off-take to the gas header. This connection should be made either from above, as shown in Fig. 5, by means of an elbow of two or three sections, and the header provided with a hopper under the incoming stream of gas, or at the bottom, with an enlargement of the off-take into a hopper or dust leg at the connection, but never into the side, on account of the fact that the gas stream carrying with it a large quantity of dust and tar vapor impinges on the opposite wall of the header, and the dust and tar vapors, a portion of which condense on the somewhat cooler walls of the header, build up a deposit which bakes into a mass as hard as stone. This condition is quite prevalent in mechanical installations where sufficient precaution is not taken to prevent direct impinging of the gas stream on the walls of the off-take and header, and for this reason it is important to construct the off-takes of easy sweeping elbows where elbows are required. In installations of hand-poked producers where the gasification rate is from one-half to one-third of that of mechanical producers, this tendency to form a hard deposit in the off-takes and header is not noticeable. This can be accounted for partly by the fact that the blast used in hand poked producers is less intense and the fuel bed is thicker and less coke dust is stirred up and carried over with the gas, also the much lower velocity in the off-take may have some effect in decreasing the trouble.

Reference was made in this connection to firing floor area and spacing of producers. The tendency sometimes seems to be to squeeze the producer into the smallest space possible, and provide space on the firing floor barely sufficient to allow for the occasional attention by the operator that the fuel bed of every gas producer requires The providing of very limited working space on the firing floor is of course, caused by the desire to cut down to a minimum the cost of the installation, and to the man who is buying the producer and paying the bill, this makes a strong appeal, but economy of this sort may be very much out of place. Here under these conditions the producer plant is really being designed and built with the financial side of the proposition receiving the most thought, when, really, as stated above, the operation of the plant and its maintenance are the factors which should govern the design with, of course, intelligent attention being given to matters of economy in construction. It is doubtful as to whether the economy in construction effected by cramping the plant into the minimum space whereby operation is made difficult and maintenance made extremely so, is very wise. We will assume, for example, some dimensions taken with no reference to any existing installation and merely intended to illustrate the point. The top of a mechanical producer is between ten and eleven feet in diameter, and a space of, say, four feet allowed on each side of the producer top will result in a housing eighteen or twenty feet wide, and will necessitate leaving the lower portion of the building entirely open in order to provide space for getting around the shell and mechanism below the firing floor, which, in northern latitudes, is not particularly good for the equipment. Then, as regards spacing, a minimum of from fifteen to eighteen feet, center to center of producer, will provide approximately two or three feet clearance between adjacent producers. This arrangement would probably reduce the size of the building to a minimum but would result in very close quarters for the operators; and small tools, such as hand poker bars, rakes and blow pipes for cleaning lines, which are required to be kept on the firing floor during operation, could be disposed of to no very good advantage and would add confusion to the already cramped quarters, while all auxiliary equipment and a portion of the producer mechanism would require separate sheds attached to the building. In contrast to this arrangement, let us assume that a space of twelve feet is allowed on one side of the producer top, and a space of six feet on the opposite side, where the off-take of the producer passes out of the building, with a center to center spacing of, say, twenty feet between adjacent producers.

This arrangement would result in a building twenty-eight or thirty feet wide with twenty-foot bays for each producer, and would permit of an inclosed building throughout, allowing plenty of clearance around the shells and mechanism of each producer below the firing floor for inspection and maintenance. It would also provide an area on the firing floor sufficient to allow a clear open space around each producer top, so that proper attention could be given when required and at the same time adequate space would be provided for all necessary tools and auxiliary equipment. In short, there is no advantage to be gained in housing the equipment in cramped quarters when good operating conditions are considered, and there may be considerable disadvantage encountered if proper clearances and operating space is not provided. Figs. 6 and 7 show an installation of mechanical producers in which sufficient space is allowed for ease of operation and maintenance, both on the operating floor and under the operating floor around the producer shells. The width of this building is 29 feet and the center to center spacing of producers is 21 feet.



FIGS. 6 AND 7. AN INSTALLATION OF MECHANICAL PRODUCERS IN WHICH SUFFICIENT SPACE IS ALLOWED FOR EASE OF OPERATION AND MAINTENANCE, BOTH ON THE OPERATING FLOOR AND UNDER THE OPERATING FLOOR AROUND THE PRODUCER SHELLS

On all mechanical producers built in this country at the present time, and in use to any extent, there are one or more members extending through the top into the fire and used for the purpose of agitating in one way or another, the fuel bed of the producer. The abrasive action of the fuel, together with the intense heat of the fuel bed, although the member is water cooled in all cases, causes it to gradually wear out and the replacing of this fuel agitator constitutes the major maintenance operation on all mechanical producers. The construction and action of this member in the fuel bed differs considerably in different producers, and the operation of replacement also differs in each producer. The necessity of providing adequate means by which this operation may be accomplished in the shortest possible time, is a matter that should receive the careful consideration of the designer. The usual method of providing for this is to suspend an I-beam from the coal bunkers in a line over the location of the agitating member in the producer. On this beam is placed a simple trolley which in turn carries a chain hoist used for lifting out the worn member and lowering the new one into place. This arrangement is generally sufficient and the only point requiring special attention is the height above the firing floor at which the trolley beam should be located, so that the worn-out member may be removed and the new one placed in position in the minimum time. While this particular operation is fairly simple, and the provision for performing the operation is simple, as it should be, still if the designer of the plant is not entirely familiar with exactly what is to be done and how it is to be done, it is ten to one that what is provided will be unsuitable and will require rearrangement before it is satisfactory.

These few points of design relating to operation and maintenance of the plant here mentioned may perhaps seem unimportant but in reality they are all practical conditions which will be encountered in every producer gas installation and if they, with many others which might be mentioned, are slighted, operation of the plant will suffer from the neglect. It is true that although one thing or another may be neglected in a producer gas installation, which, if included in the design, would have improved operation, still it is always possible to operate the plant, and what may have once been considered a difficult and troublesome operation, will gradually come to be considered as normal. However, a condition of this kind is not as it should be, and at the outset every effort possible should be made to include in the original design, the minor, as well as the major factors that will aid in producing the most satisfactory results when the installation is put into operation.

(To be concluded in February number)

The Laboratory

By J. B. KRAK

Analysis of Batches

Frequent analyses of batches are advisable, as a check on the care and accuracy with which the batch is compounded, and as a test of the efficiency of the mixing process. The analysis should agree closely with the calculated batch composition.

In case a sample of unknown composition is submitted for analysis, qualitative tests are necessary before quantitative estimations of the ingredients can be made.

QUALITATIVE ANALYSIS.—Usually the color gives indications as to the kind of batch to be examined. A red color, due to red lead, indicates a flint glass batch. Presence of black particles make it probable that a salt cake batch has been submitted, the black particles being pulverized coal.

Treat a 100 gram sample with hot water. The alkalies (soda ash, salt cake, potash, niter) go into solution. Filter, and to the filtrate add hydrochloric acid. Effervescence indicates soda ash or potassium carbonate. To the acidified solution add a few drops of barium chloride solution. A heavy white precipitate indicates salt cake.

To the water-insoluble residue add dilute nitric acid. Effervescence indicates the presence of limestone or barium carbonate. Filter and to the filtrate add a few drops of sulphuric acid. A white precipitate indicates barium. If no precipitate is formed add ammonia and ammonium oxalate solution. A white precipitate shows the presence of limestone in the batch, provided the water-insoluble gave off gas on treatment with acid. If this is not the case, a white precipitate with ammonium oxalate shows that the lime was present as burnt lime.

The acid insoluble residue contains sand, silica from the limestone and, if the batch is a salt cake batch, it contains the coal.

QUANTITATIVE ANALYSIS.—Soda-lime glass batch. Weigh a ten gram sample, transfer to a beaker, add hot water and digest for a few minutes with frequent stirring. Filter on a tared Gooch crucible and wash with hot water. Dry at 105° C. and weigh. The loss in weight multiplied by ten gives the percentage of soda ash in the batch.

Leach the water insoluble residue in the crucible with hot dilute hydrochloric acid and wash with hot water. Dry and weigh. The loss in weight represents the limestone. The weight of the residue represents the sand and the silica present in the limestone.

Lead glass batch containing sand, marble, red lead and potash. Estimate moisture by drying a ten gram sample at 105° C. Transfer the dried sample to a beaker and treat with hot water. Filter on a tared Gooch crucible, dry at 105° C. and weigh. The loss in weight represents the potash. Treat the residue in the crucible with a mixture of nitric and oxalic acids which dissolves the lead oxide and the marble. Wash with hot water, dry and weigh. Reserve the filtrate for the estimations of lead and calcium. The loss in weight gives an indication as to their combined weights. The acid insoluble residue is the sand.

Separation of lead and calcium. Gas the solution with hydrogen sulphide. Filter the black lead sulphide and dissolve in hot nitric acid. Add a few drops of sulphuric acid. Evaporate to fumes of sulphur trioxide, dilute and filter on a Gooch crucible. Wash with 10 per cent sulphuric acid. Dry, ignite to a dull red heat and weigh as $PbSO_4$. To the filtrate from the lead sulphide add ammonia and heat to boiling. Add a few drops of ammonium oxalate, allow the precipitate to settle, wash, ignite the precipitate to constant weight over a blast lamp and weigh as CaO.

Salt cake glass batch consisting of sand, salt cake, limestone and coal. Estimate moisture and heat with hot water. Filter, dry and weigh. The loss in weight represents the salt cake. Treat the residue with hot dilute hydrochloric acid, wash with hot water, dry and weigh. The loss in weight is due to the limestone. The insoluble residue is sand and coal. Dry and weigh. Heat to a dull red, until the coal particles are consumed. Allow to cool and weigh. The loss in weight represents the coal. The final residue is the sand present in the sample.

More accurate results are obtained by direct precipitation of sulphate with barium chloride as barium sulphate and calculation to sodium sulphate, and of calcium as calcium oxalate in ammoniacal solution, weighing as calcium oxide and calculation to calcium carbonate.

Corrections

In the article on COLORED GLASS under the Laboratory heading, beginning on page 294 of the December, 1921, issue there appeared three typographical errors, as follows: Page 295, left-hand column, fifteenth line from top, the word "least" should read "best." On line thirty, the word "often" should read "of tin." Line thirty-two, right-hand column, the words "stasmic acid" should be "stannic acid."

Precision Tests of Large Capacity Scales

The accuracy that can be obtained from large weighing scales is not generally known among engineers and others concerned in the subject.

Technologic Paper No. 199 of the Bureau of Standards outlines scientific and systematic procedure for the accurate testing of large-capacity, compound-lever scales by a method which has been developed and used by this Bureau in connection with its work in testing railroad master scales and grain hopper scales. The plan can be adapted to the test of almost any compound-lever scale. The price of this paper is 5c. and it may be obtained from the Superintendent of Documents, Washington, D. C.

The apparatus used in the work is described, and the method of testing is explained. In the interest of a uniform and efficient method of scale testing, the scheme outlined is recommended to those who have occasion to carry out such work on large scales where accuracy of a high order is required.

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ADVERTISING RATES ON APPLICATION

NEW YORK, JANUARY, 1922

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CLASSIFIED BUYERS' GUIDE PAGE 7

Index to Volumes 1 and 2

Separate copies of the Index to Volumes 1 and 2 of THE GLASS INDUSTRY, published in this number, may be obtained upon request to the publishers by readers who desire them for binding, filing, or other purposes.

Architects and Glass Makers

In the golden age of architecture, when art and religion combined to create the cathedrals which fill our minds with amazement, co-operation between the architect and the glassmaker was something which went without saying. So much space was devoted to glass in these buildings that the architect was obliged to invent a special method of support to keep the edifice from collapsing. On the other hand, the glassmaker supplied materials of such excellence that their like has never been equalled since.

In later years, when glass was used merely as a transparent and protective medium, the need of intelligent understanding of one another's problems and limitations became slight, and this state of affairs has continued until comparatively recent years.

The fact that conscious efforts are now being made to establish contact between architects and glassmakers, with the object of creating a mutual interest in and understanding of one another's needs is an augury of great promise. We feel sure that the Architectural League of New York, representing the best brains and the biggest personalities in American architecture will receive a hearty response to their appeal for co-operation, which is published elsewhere in this issue.

Industrial Significance of Standardization

The American Engineering Standards Committee has recently published the results of a study of German methods of standardization. The subject of industrial standardization is receiving a great deal of attention in this country as well as abroad. This is due partly to the war, which made the strictest economy a matter of life or death, and partly also to the severe business depression which came as a result of the war waste. Industrial leaders are coming to a realization of the many advantages which may accrue to their line of manufacture through the adoption of rules which lead to more complete standardization of their industry.

Standardization stabilizes production and employment, reduces costs by making mass production possible; it makes for quicker deliveries and simplifies the carrying of stocks. By concentration on fewer lines standardization increases efficiency and economy. By elimination of non-essentials it helps to put competition on a basis of efficiency in production and distribution and upon the intrinsic merits of products. Our trade with countries which are adopting rational standardization programs makes it increasingly urgent that American industry shall not lag behind in this matter. Unless we remain in the forefront of every progressive move in industrial policy the hard pressed countries of Europe will drive us from our present position in foreign markets and will even transfer their competition to our own land.

A practical step towards standardization has been taken by the Bureau of Standards which reports that final specifications for glass tableware have been written and submitted to the Army, Navy, Marine Corps, Public Health Service, and General Supply Committee for official acceptance. Acceptances have been received so far from the Army, Navy, and Marine Corps, and already a number of requests have come to the Bureau from other interested parties.

Technical Consultation Service

THE GLASS INDUSTRY invites its readers to refer to this department any problems with which they may be confronted pertaining to raw materials, glass technology, laboratory and factory practice. While making no pretensions to the possession of unbounded knowledge or infallibility THE GLASS INDUSTRY is ready to assist its readers to the best of its ability in solving their problems. Readers who can offer better suggestions are invited to submit them.

Answers to all questions will be made by mail as promptly as possible. The source of all inquiries will be held in strict confidence.

QUESTION 16.—Is it practicable to reduce silica to the molten state by electric heat? Our client is remote from industrial coal supply, but has very low cost hydro-electric power at his command, and if electricity is practical might consider establishing a glass industry.

ANSWER.—Special furnaces have been built and experiments have been made in melting glass by electricity, but as far as we know none of them has been successful on a commercial scale. We understand that at least one glass company uses a small electric furnace for melting glass for laboratory tests.

Correspondence

To the Editor of THE GLASS INDUSTRY:

The Architectural League of New York which has a very large membership and includes within this membership all of the leading architects, etc., has developed a policy of bringing together all of the allied arts and sciences that go into the construction of a building.

In other words, an effort is being made to bring forcibly before all of the architects who literally have in their hands the control of all of the developments of buildings for New York, and the majority of the country for that matter, what is being done by the glass concerns, and in turn a very strong endeavor is being undertaken to create sympathetic relationship between the glass concerns and the architects so that there can be co-operation based on mutual understanding.

It is expected that this policy is going to bring about a very beneficial result, and for that reason I would like very much to take the opportunity of bringing to your notice from time to time any matter of this nature that we of the League feel would be of interest to your readers. I am enclosing a short story on this policy, which if you could make use of, I know would be very much appreciated by all my fellow members and myself.

ALFRED C. BOSSOM,
Chairman, Public Information Commissioner Architectural League of New York.

New York, December 15, 1921.

THE STORY

The Architectural League of New York this last year held a great exhibition in the south wing of the Metropolitan Museum for a month, and there realized that the co-ordination of ths arts, trades and sciences which go to make the completed structure would benefit materially by more direct attention.

For that reason an aggressive policy has been developed of bringing the various glass concerns to the architects and the architects to the glass concerns, so that they can mutually understand what each can produce and the advantages the designer will get from having this knowledge. The results of this getting together would prove a great benefit not only to the glass trade and the architects, but to the general public, and it is with this idea in view that periodical exhibitions are held in the League's rooms at 215 West 57th Street, where glass products will be displayed and which are open not only to the members of the architectural profession but also to the public at large. The dates of these various exhibitions will be announced shortly.

Journal of the American Ceramic Society

The October number of the *Journal of the American Ceramic Society* contains the following articles:

HUMIDITY SYSTEM OF DRYING TERRA COTTA, by F. B. Ortman and H. E. Davis.

VARIATION IN HEAT TREATMENT OF A SILICA BRICK IN THE CROWN OF A TUNNEL KILN, by A. A. Klein and L. S. Ramsdell.

SEDIMENTATION AS A MEANS OF CLASSIFYING EXTREMELY FINE CLAY PARTICLES, by H. G. Schurecht, of the Ceramic Experimental Station.

THE APPLICATION OF HEAT IN CERAMICS, by Gerald Fitz-Gerald of the Maxon Furnace & Engineering Company.

THE PRODUCTION OF SOME WHITE ENAMELS FOR COPPER, by R. R. Danielson and H. P. Reinecker of the Bureau of Standards.

AN OXYGEN-ACETYLENE HIGH-TEMPERATURE FURNACE, by Hewitt Wilson of the University of Washington.

USE OF SPECIAL OXIDES IN PORCELAIN BODIES, by R. F. Geller and B. J. Woods.

The issue also contains 96 abstracts of recent articles published in English, French and German.

The November number of the *Journal* contains the following articles:

POSSIBILITIES OF TERRA COTTA CASTING, by R. F. Geller.

NOTE ON THE HARDNESS OF GLAZES, by George Blumenthal, Jr.

A STUDY OF SOME BOND CLAY MIXTURES, by D. H. Fuller.

POROSITY: I. PURPOSE OF THE INVESTIGATION. II. POROSITY AND THE MECHANISM OF ABSORPTION, by Edward W. Washburn of the University of Illinois.

DISCOLORATION OF WHITEWARE FIRED IN CARBORUNDUM SAGGARS, by H. Spurrier.

NOTE ON THE DISSOCIATION OF FERRIC OXIDE DISSOLVED IN GLASS AND ITS RELATION TO THE COLOR OF IRON-BEARING GLASSES, by J. C. Hostetter and H. S. Roberts.

The issue contains 32 abstracts of recent articles.

Recent Publications

CHEMICAL ENGINEERING CATALOG, 1921. Sixth annual edition, published by the Chemical Catalog Company, Inc., New York.

This mammoth volume of 1294 pages, 8¾ by 11½ inches in size, is published under the supervision of an official committee appointed by the American Institute of Chemical Engineers, the American Chemical Society and the Society of Chemical Industry. It consists of a general directory of manufacturers of chemicals, raw materials, equipment used in the industries employing chemical processes of manufacture, occupying 232 pages; manufacturers' condensed and standardized catalog data relating to the above mentioned equipment and materials, occupying 973 pages; and a technical and scientific books section cataloging and describing a practically complete list of available books in English on chemical and related subjects.

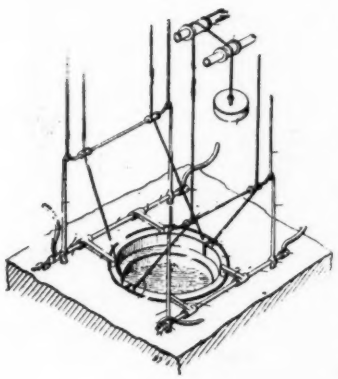
The catalog is leased at the annual rate of $2.00 a copy to chief chemists, chemical engineers, works managers, superintendents; consulting, designing and constructing engineers, heads of chemical departments in educational institutions, Government technical departments, and libraries, foreign chemists and engineers. To others a charge of $10.00 is made for the volume.

THE MAKING OF REFLECTING SURFACES. Report of the Physical Society of London and the Optical Society. A discussion on the making of reflecting surfaces, which took place in November, 1920, at the Imperial College of Science and Technology. Contains a bibliography of the more important papers on the subject of metallic deposition on glass. Eleven articles are devoted to descriptions of methods for obtaining reflecting surfaces. For sale by The Optical Society, Imperial College of Science and Technology, South Kensington, London, S. W. 7. England. Price, 5 shillings, plus postage, 9½ pence.

Recent Patents

NEW INVENTIONS DESIGNED TO IMPROVE GLASS AND THE MEANS OF PRODUCING IT

Copies of the Patent Specifications mentioned below may be obtained from the Commissioner of Patents, Washington, D. C. Price 10c. each.



Cooling Device for Glass-Drawing Apparatus. U. S. 1,396,216. November 8, 1921. Walter A. Jones.

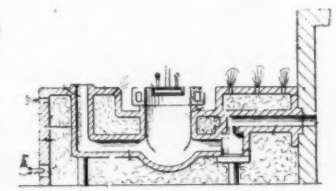
The invention consists of a cooling device as shown in the accompanying illustration, comprising a stationary support, a cooling ring formed of complemental sections movably mounted upon the support independently of each other, and means for supplying a cooling medium to these sections.

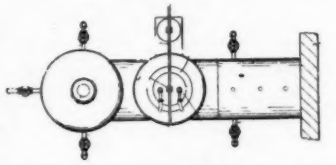
Method of Casting Plate-Glass and Apparatus Therefor. U. S. 1,396,330. November 8, 1921. John W. Kunzler, Pittsburgh, Pa.

This invention relates to the method of casting plate-glass, comprising the steps of continuously feeding molten glass into a tiltable vessel, periodically tilting the vessel to pour the molten glass therein onto a casting table across the face thereof. During the pouring operation the table is moved in a direction at right angles to the axis of the vessel to spread the glass in the form of a sheet on the table and during such movement the table and glass is moved under a sheet-forming roller to roll the glass to the required thickness.

Glass-Delivery Apparatus. U. S. 1,394,920. October 25, 1921. Richard T. McGee, of Wheeling, W. Va.

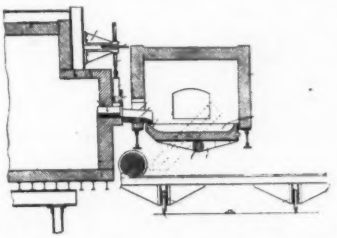
This invention relates broadly to glass working apparatus, and it has for its primary object to provide an apparatus whereby glass may be directly delivered from a glass melting tank to a glass-shaping mold without exposing the same to the atmosphere and without the usual manual handling.





The inventor's claims include a glass delivery apparatus, comprising, in combination with a melting tank, a well located at a suitable distance from said tank, a conduit for conducting glass from said tank to said well, a valve chamber located intermediate the ends of said conduit and separating the latter into two members of which the member adjacent to the tank is disposed on a higher level than the other member, said chamber being adapted to have glass gravitate thereto from the first mentioned member, a reservoir located over and in open communication with that member of the conduit located between the valve chamber and the well, said reservoir having means operable therein for producing glass displacement whereby glass is discharged through the mouth of the well, and a vertically movable float located within said valve chamber and operating as a valve whereby upon actuation of said displacing means the entrance opening of said chamber is automatically closed against a return flow of displaced glass.

Process of Making Plate-Glass. U. S. 1,397,287. November 15, 1921. J. H. McKelvey, and C. Ryan, of St. Louis, Mo.

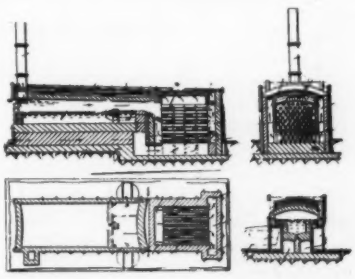


This invention relates to improvements in processes for making plate glass. One object of this invention is to provide a process of manufacturing plate glass in which a continuous melting operation of the batch may be employed, and in which the molten glass may be efficiently, economically, and quickly handled from the time it is melted until the plate is placed in the lehr.

In the practice of this improved process, the use of flasks or pots is eliminated and a continuously melting furnace is provided, from which the glass is drawn or poured into a receptacle mounted in and forming part of an auxiliary chamber or furnace, where it may be properly and efficiently treated at the desirable temperature, after which it is deposited directly upon the table upon which it is to be rolled, and conveyed therewith and thereby to a position adjacent the lehr where the rolling operation takes place, after which the plate is moved into the lehr for annealing. It is generally necessary and advisable to maintain a heat in the auxiliary chamber considerably less than that of the furnace, although in some instances it may be highly advisable and necessary to heat such chamber and its contents to a point appreciably higher than that of the furnace. In either event, to produce a proper and satisfactory product by the use of this process and apparatus, it is deemed highly essential to be able to control the heating of the chamber absolutely independently of the main heating furnace, so that the desired heat treatment can be carried on in this chamber at the proper degree of temperature without affecting in any way the furnace heat or without having to rely upon the furnace heat for such heat treatment.

Glass-Melting Furnace. U. S. 1,395,591. November 1, 1921. Lambton Le Breton Mount, of St. John's Wood, London, England.

This invention relates to glass melting furnaces of the kind in which the tank for molten glass is located below an arched crown formed with longitudinal passages for air that is heated by a recuperator arranged at the rear end of the said tank.

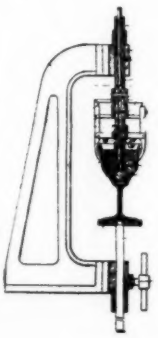


Objects of the invention are, to provide an improved arrangement of outlets suitable for the feeding of molten glass to automatic or other glass ware machines worked on the flow-feed system, to provide an improved construction of

recuperator, and an improved system of flues or longitudinal passages in the furnace crown.

For these purposes according to the invention each flow feed outlet is located at the end of the tank adjacent to the recuperator and consists of a hole formed through a raised portion of the bottom of the tank at the side or end thereof. The hole through the raised portion of the tank bottom permits the molds of a glass bottle machine to go under the glass in the tank and to be vertically fed therefrom. The recuperator is constituted by a group of superimposed tubes of refractory material so supported as to allow air to support combustion to flow upwardly around and between the tubes from an air passage located below the glass tank into air passages arranged in the furnace crown below other passages in the furnace crown through which the hot products of combustion pass to the chimney which is at the front end of the furnace. The recuperator tubes are so arranged in relation to flue chambers formed in the brickwork setting that the hot gases leaving the furnace are caused to flow to and fro through the tubes during their passage to the rear end of the said upper passages in the furnace crown. The longitudinal passages formed in the furnace crown are made by building in the hollow furnace crown, tiles suitably spaced apart to provide for expansion and contraction.

Art of Ornamenting Glass Articles. U. S. 1,396,691. November 8, 1921. John A. Milliken, Bayonne, N. J.



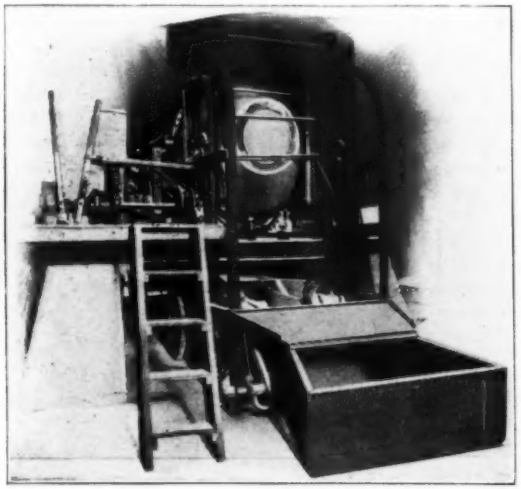
The object of this invention is an improvement in the art of ornamenting hollow glass articles, comprising inserting a chuck into the article without contacting therewith, temporarily attaching the chuck and the article by an interposed material capable of being applied in molten condition, subjecting the article to the action of an ornamenting apparatus by connecting the chuck and the attaching article to said apparatus and finally changing the physical condition of the interposed material to permit of the separation of the chuck and the attached article.

Glass Factory Equipment and Supplies

THE GLASS INDUSTRY will be glad to publish descriptions of new and useful devices, machinery and supplies of interest to the glass manufacturing trade. Most of the information printed in this department comes direct from the manufacturers of the products described.

Smith Batch Mixer

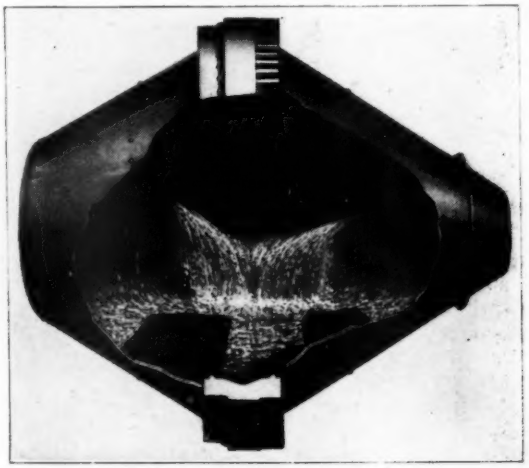
Mechanical batch mixing is so obviously superior to hand-mixing, particularly as regards large and economical production and uniformity of the mixture, that it has not been surprising to observe its rapid adoption by glassmakers during the past few years. One of the best known power-operated mixers is that manufactured by the T. L. Smith Company, Milwaukee, Wis., which has been installed in many factories. For the information of those who are not familiar with this machine, a brief description of the principles upon which it operates is given here.



SMITH BATCH MIXER

The body, or drum, of the mixer is of a double-cone shape and within the drum are converging blades fastened to the inside of the steel shell in such positions as to cause the batch materials to turn over and over as the drum revolves, with a simultaneous end-to-center movement of the batch that mixes it thoroughly, quickly and homogeneously. The batch is discharged at will by a small mechanical device operated by a hand lever, which tilts the drum without stopping or interfering with its rotation, and empties the batch in a few seconds into the bin, chute, car or other receptacle provided for it.

The manufacturers state that the construction of the mixer is such that there is no unnecessary agitation of the batch, therefore the stirring-up of dust is reduced to the smallest possible point and the dust that is raised is confined inside the drum by means of sealing doors which remain closed during the process of mixing and are automatically opened when the mixer tilts to discharge the mixed batch. The Smith mixer eliminates the labor of mixing and makes operating conditions very much healthier and more comfortable for the employees. The operation of the mixer is very simple, any ordinary unskilled workman or boy being competent to handle it safely and efficiently.

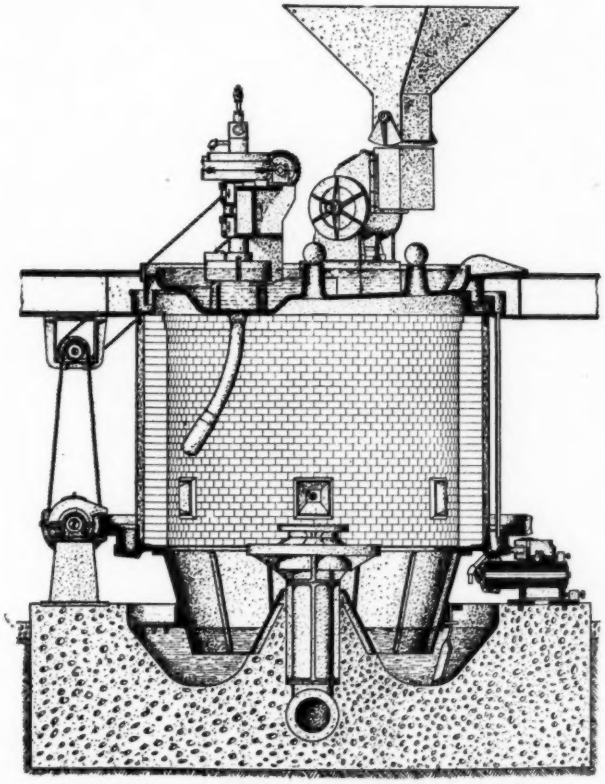


VIEW OF INTERIOR OF MIXING DRUM

Motor drive for the mixer is provided when desired, also power loaders adapted to the peculiarities of the situation in which the installation is to be made. Several sizes of Smith mixers are made, ranging from 10-S, having a batch capacity of 900 pounds, with output per hour averaging 4½ tons; to 28-S with batch capacity of 2,700 pounds and average hourly output of 14 tons.

New Small Automatic Gas Producer

Recognizing the need for an automatic gas producer of smaller dimensions and capacity than that of the standard R. D. Wood machine, the H. L. Dixon Company, Pittsburgh, Pa., who, as agents in the glass trade for the Wood producer, have made a large number of installations in the United States and Canada of the 10-ft. 6-in. diameter producer—usually called the 40-ton machine—have designed a smaller unit, 8-ft. 6-in. in diameter, which while retaining the fundamental principles and distinctive features of the large size Wood producer is especially adapted to single unit factories where each furnace can be connected directly to its own gas producer, and to such other plants as plate glass factories and other large works where the furnaces are spread out over an extensive area. In places where battery installations of extreme flexibility are desired and where it may become necessary from time to time to install additional units as the consumption of gas increases, the new 8-ft. 6-in. unit will also fit in very satisfactorily.



NEW SMALL SIZE AUTOMATIC GAS PRODUCER

The outstanding features of the new producer as described by the manufacturer are:

Continuous agitation, which tends toward a high rate of gasification and reduces clinker trouble. The path taken by the agitating bar is clearly shown in the accompanying chart.

The gasification of 25 to 30 tons of coal each 24 hours, producing a uniform quality of gas at 160 B.t.u. per cubic foot when reduced to 62 degrees F., from a producer having a fuel bed area of only 56 square feet. As the maximum gasification from the ordinary hand-stoked producer of this size would be ten tons of coal, it is readily seen that the automatic producer would replace three of the ordinary hand-stoked producers of the same size.

The cast steel water-cooled top plate eliminates the trouble encountered with special shape refractory crown brick and reduces the expansion of the producer top, which in turn prevents the agitating machinery and feeding mechanism from getting out of line or binding. Covered with a steel grating, this top provides a cool floor over producer for the benefit of the operator.

The standard shape brick lining can be easily prepared from brick usually carried on hand at the glass works.

The producer shell is equipped with three-point duplex roller support and guide to insure alignment.

A worm drive of extra heavy construction is used to insure a slow uniform movement of the shell. It is noiseless and together with the chain transmission provides an efficient drive which is self-oiling and self-aligning.

The speed reducer, direct-connected to motor, is enclosed to insure perfect alignment of reducing gears and prevent binding resulting from dirt or other causes. The speed reducer and other gears throughout the driving mechanism are enclosed in guards, preventing any danger to workmen.

Removable bosh plates, which are accessible from the outside of the producer, facilitate repairs to the producer and grates, and replacement of any parts inside the producer.

All connections on this producer are bolted, no rivets being used throughout the entire shell.

The single stirrer bar is properly located with reference to the coal feed and with increased agitating travel, provides continuous agitation of the entire fuel bed, spreading the coal uniformly and effectually preventing the formation of clinkers over the entire surface of the bed. This bar is properly water-cooled and is installed in such a manner that it can easily be removed for replacement.

Positive control of the air and steam to the producer is provided by a steam turbine fan. This positive turbine has been used on the large Wood producer and the manufacturers state that while they have never known of one to give any trouble, an auxiliary steam jet blower is provided for cases of emergency, should anything happen to the fan.

An automatic coal feed and automatic ash plow is provided, making the automatic producer live up to its name. Coal is fed through a rotating drum which prevents the leakage of gas, and being connected to the driving mechanism of the producer, insures a uniform coal feed which can be regulated to suit the exact amount of gas required. The automatic ash remover keeps the producer operating continuously, naturally lowering the fuel bed as more fuel is added.

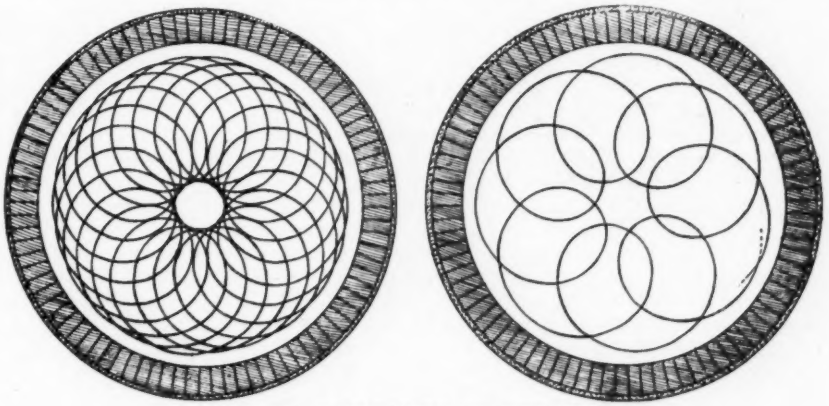


DIAGRAM OF PATH TAKEN BY AGITATING BAR

The Kingdom of Success Is Within You

A New Year's address made to the employees of The Chapman Engineering Company, by William Brewster Chapman, president, contains so much of universal interest and value that it is reproduced below for the benefit of all:

Speaking broadly, Success consists in getting into harmony with the Law. Practically it means fitting into the needs of an organization or situation, rising to its opportunities and meeting its emergencies.

The old way of attaining success was by taking advantage of others. The new way is by taking thought of others. The psychology of success is the psychology of human brotherhood. The most successful companies of the future will be those that express the most sympathetic human understanding, thus insuring the best team-work and producing the most power with the least friction.

Each one of you in his position in this company is running a little business complete in itself. Is it a success? It is your opportunity for self expression. It will pay you dividends in proportion to the quality and quantity of the product you turn out. Not one of you is receiving all we are willing to pay you for the work we believe you are capable of in the position you now hold. It is up to you, and we want to help: for each of us in helping the other helps himself.

Do you get discouraged at times? Let us talk over your problems and ours. Possibly we do not understand each other as we should. Hoover says that 50% of the difficulties of the world are due to failure to have all the facts. Or possibly you do not realize how necessary it is to have a determined will and a buoyant confidence if one is to dominate any situation. We must all learn to say with Napoleon "There are no Alps."

There is no need of worrying about what is going to happen; we can cause it to happen. It is for you to decide what is to be. Nothing keeps one mediocre save his own thoughts. No man ever grew rich by thinking poverty. To think success is to create it. To be conscious of personal power is to have it. There is no power but thought. Out of it the world was created. And through man's thought our world is perpetually being re-created.

The thing that makes one man a slave, another a master is his consciousness. It is largely a self-imposed state of mind. Have you the success consciousness? As a company are we really teeming with opportunities? Are we living in the consciousness of the prosperity that is ours for the effort? And are we making the effort?

In our small organization the success of the company is very directly connected with the opportunity of the individual. To an unusual degree we are all insiders and have the personal interest of an insider. I may be permitted, therefore, to make a few personal suggestions:

The first step in success is co-operation and co-operation starts with tolerance. The best thing I've heard on tolerance was from a modern minister who said to his congregation—"Leave off trying to make other people like yourself, one's enough." It's novel advice from the pulpit, but it's good.

Next to co-operation comes "pep." It can only be kept alive by exercise, play, good food and a happy state of mind. Important as it may be what food we eat, of vastly more importance is the state of mind in which it is eaten. Joy is a great creative power, it is the keynote to a successful life. Act as though you were glad to be alive and the response will be a new realization of life itself.

My final suggestion is that if you want to get on, you must study more. A vast amount of special information is quite as necessary as special experience. If you neglect either one you impose a limit on your future.

For many centuries the world forgot that Jesus taught that "The Kingdom of Heaven is within you." And now the new business psychologists are teaching that "The Kingdom of *Success* is within you." Let us always remember where to look for these two kingdoms. We are going to need them all through life.

The New Year is at hand; my best thought for the months that are to come is that we occasionally turn our attention within and there in quietude perchance we may find the secret of Success—the Key to the Two Kingdoms.

Annual Meeting, Cut Glass Manufacturers

The annual meeting of the NATIONAL ASSOCIATION OF CUT GLASS MANUFACTURERS was held December 8th, 1921, at the Adelphia Hotel, Philadelphia, Pa., with President G. William Sell in the chair. Representatives of 22 firms were present. E. J. Cattell, on behalf of the Mayor, welcomed the members to the city.

The meeting was addressed by H. C. Fry, Mr. Bennett of *Jewelers' Circular*, W. Calvert Moore and Raymond E. Parker of the *Keystone*, H. R. Smith of China Glass & Lamp Publishing Co., Mr. Snyder and his associate of the Acorn Advertising Agency who spoke regarding advertising of cut glass and the Association Label, and offered their assistance to make the advertising campaign a success. The label proposition was taken up for discussion and a total of nineteen members signed the subscription list.

A vote was taken and it was the desire of all present that the committee proceed with the label and advertising plans. Thomas P. Strittmatter presented a new form of label which met with the approval of all present.

Officers for the ensuing year were elected as follows:

President, G. Wm. Sell, of Krantz & Sell Co.; vice-president, F. L. Morecroft, Ideal Cut Glass Co.; secretary, R. H. Fender, Powelton Cut Glass Co.; treasurer, T. P. Strittmatter, Quaker City Cut Glass Co.; directors (present at meeting), D. C. Tracy, Geo. Borgfeldt & Co.; W. E. Corcoran, Empire Cut Glass Co.; J. Howard Fry, H. C. Fry Glass Co.; Arthur Blackmer, Hunt Cut Glass Co.; C. H. Taylor, Jewel Cut Glass Co.; Geo. W. Murphy, J. J. Niland, Robert A. May, Geo. Phillips & Co., Ltd.; Geo. Sherman, Pairpoint Corporation; Thos Skinner, Thos. Skinner & Son. The following were also elected directors though not present at the meeting: J. J. McKenna, E. F. Kupfer, O. S. Atterholt, J. W. Robinson.

Others present at the meeting were: Chas. Becker, W. E. Corcoran, Empire Cut Glass Co.; H. C. Fry and David Denton, H. C. Fry Glass Co.; A. Fisher, Fisher Cut Glass Co.; Mr. McMullin, Flemington Cut Glass Co.; Mr. Herrfeldt, J. H. Herrfeldt & Co.; A. A. Meltz, Libbey Glass Manufacturing Co.; Edw. W. Mayer, Mr. Strunk, Figueroa Cut Glass Co.; Mr. Schotten, Thos. Schotten's Sons, Inc.

In the evening the usual enjoyable banquet was held.

Lighting Fixture Market at Milwaukee

Preparations for the third annual LIGHTING FIXTURE MARKET and second joint convention of associations connected with the lighting fixture industry to be held at Milwaukee, Wis., during the week of January 30 to February 4, are in full swing. An exhibition of fixtures will be held in the Milwaukee Auditorium and elaborate plans for a "Better Lighting Campaign" to stimulate public interest are being made. Special rates for delegates will be granted by many railroads. One hundred and sixty-one concerns have already arranged for exhibits in the Auditorium, among which are included the following manufacturers of illuminating glassware.

Consolidated Lamp & Glass Co., Coraopolis, Pa.
Corning Glass Works, Corning, N. Y.
Eagle Glass Company, Wellsburg, W. Va.
Gill Glass Company, Philadelphia, Pa.
Gillinder Bros., Port Jervis, N. Y.
Gillinder & Sons, Inc., Philadelphia, Pa.
Gleason-Tiebout Glass Company, Brooklyn, N. Y.
H. Northwood & Company, Wheeling, W. Va.
Hocking Glass Company, Lancaster, Pa.
Ivanhoe Regent Works of General Electric Co., Cleveland, Ohio.
Jeannette Shade & Novelty Company, Jeannette, Pa.
Jefferson Glass Company, Follansbee, W. Va.
Macbeth-Evans Glass Company, Pittsburgh, Pa.
Phoenix Glass Company, New York City.

Bureau of Mines Investigates the Monroe Gas Field

The United States Bureau of Mines at the request of Governor John M. Parker of Louisiana, and in co-operation with the Bureau of Conservation of that state, has made an investigation of the natural gas field located in the parishes of Ouachita, Morehouse and Union, and a report based on conditions as they existed on April 1, 1921, was issued as Bulletin No. 9 by M. L. Alexander, Commissioner, Department of Conservation, State of Louisiana.

The remarkable features of this field brought out by the report are its high rock pressure, its enormous volume of gas and the immense area of proven gas territory. The survey conducted by H. W. Bell and R. A. Cattell, petroleum engineers, of the Bureau of Mines, disclosed that the field covered 212 square miles and recent drilling shows it to be considerably larger. The engineers computed the quantity of gas contained in the reservoir to be nearly 68 billions of cubic feet (measured at a rock pressure of 1,050 pounds per square inch) and the Bulletin, discussing the amount of gas recoverable from this reservoir and the probable length of life of the field, says:

> "It would probably be conservative to say that, if the present wells are now put in the best possible shape, if they are properly cared for in the future, if no more wells are allowed to go wild, if future wells are properly drilled and properly cared for, and if no more wells are drilled than are needed, at least 50 per cent of the gas should be recoverable. The field then should give a recovery of 150,000,000 cubic feet per day for 43 years. Of this 150,000,000 cubic feet per day, at least 100,000,000 cubic feet should be delivered to consumers. During the latter part of the life of the field compressors would be needed to recover the gas and it is probable that the field would not deliver gas at the rate of 150,000,000 cubic feet per day. It should, however, deliver gas at a lower rate for a longer period."

The Bulletin goes on to discuss the quality of the gas, variations in different zones of the field, probable source of the gas, and the geologic features of the territory in which it is found. The history of the development of the field, which began about five years ago, is given, present conditions are outlined, the methods of drilling employed are discussed, suggestions for stopping waste and conserving the gas are made and many other matters touched on.

On April 1, 1921, there were 65 wells considered to be in condition to supply gas and 36 actually supplying it to commercial consumers. A large part of the production is used by carbon producing plants. A quantity is piped to the city of Monroe for domestic and industrial uses. This city is vitally interested in the development of the field and its Chamber of Commerce of which C. H. McHenry is president; Richard Downes, Jr., treasurer and S. M. Collins, secretary, points out that while industries that burn natural gas in northern and eastern centers are paying from 25 to 50 cents per thousand feet for their gas, the industries in the Monroe field are supplied at as low a rate as five cents a thousand and they predict, as a consequence that a great industrial center will be built up there.

American Valuation Plan Criticized

At a recent informal dinner of the Chamber of Commerce of the United States at Washington, attended by members of the National Conference of Business Paper Editors, a prominent officer of the Government made the statement that the American valuation proponents are going to be disappointed in the results if it should be made operative. With descending production costs there is an increasing disparity in the cost item in different countries, and the result will be that goods from countries owing us money will be kept out, while goods will be let in from countries like Germany, where costs are relatively so low that tariff imposts on American values would still leave a large margin of profit to the producing countries.

Exports to Canada Must Be Marked

Under a new law, beginning January 1, 1921, all goods imported into Canada capable of being marked without injury are to bear an indication of the country of origin. Under representations by the United States Department of Commerce revisions of the original drastic regulations were made and recently a list of rulings made by the Canadian Commissioner of Customs has been issued. *Commerce Reports* of December 5, 1921, contains these rulings, among which the following are of importance to glass manufacturers and glass house supply concerns.

INDICATION OF THE COUNTRY OF ORIGIN:

Wording of.

The following are specimen indications of the country of origin which are approved when applied to an article or commodity with which the term is appropriate: "Printed in England," "New Zealand Produce," "Country of Origin—New Zealand," "Grown and Packed in California, U. S. A.," "Grown and Packed in U. S. A."

The following are specimen indications of the country of origin which are not approved: "Manufactured by the Jones Co., London, Eng.," "Sheffield," "New York, U. S. A.," "Limoges," "Packed in Ceylon," "London Made," "British Manufacture," "Unis France," "Prepared and packed in U. S. A.," "British Products," "England," "Made in Eng.," "Made in America."

ACIDS AND CHEMICALS:

When in packages—*each package or container.*

When in tank cars—*no marking required.*

BOOKS AND PUBLICATIONS:

"Printed in —" or "Made in —," to appear on books, booklets or pamphlets on the inside or outside front or back cover, on either side of the title page or on the back page.

Books or publications already printed may have the required indication of the country of origin indelibly impressed thereon with a rubber stamp.

Books, booklets, pamphlets, advertising matter, posters, circulars, folders, catalogs, post cards, fashion publications, globes (geographical), maps sheet music, calendars, calendar pads, greeting cards, pictures, photogravures, engravings, embossings—*each article.*

BRICK, TILE, AND BUILDING BLOCKS:

Fire brick, paving brick, face brick, enameled brick, mosaic tile, quarry tile, floor and wall tile, shelf tile, terra-cotta blocks, silo blocks—*no marking.*

CHINA CLAY. *No marking.*

CONTAINERS. In accordance with Section 11 (*)

CANS:

Cans for spices, cans for baking powder, cans for talcum powder, cans for condensed milk, small tins for samples, collapsible tubes, cartons, cartons for cigarettes, cartons for photo films, cartons for matzo, corrugated and solid fibre shipping cases, corrugated and solid fibre boxes, wooden containers—*each article, mark to be printed or diesunk.*

BOTTLES AND JARS—*adhesive label affixed to each article.*

COOPERAGE STOCK. Staves, headings and hoops—no markings required when coming under provisions of Section 18 (*)

CORKS. *Each package or container.*

FURNACES, STOVES, AND HEATING APPLIANCES.

Furnaces, when imported unassembled or in a number of pieces comprising one complete article—*on the name plate or principal part of each complete article.*

GLASSWARE.

Glassware (except as otherwise provided below)—*each piece to be stenciled or to bear an adhesive label attached.*

Plate glass, window glass, wire glass, sheet glass for photoplates, glass tubing—*each case or container.*

MACHINERY AND MECHANICAL EQUIPMENT.

Air Compressors—*on a name plate securely affirmed thereto or stamped, stenciled or diesunk on the principal part thereof.*

Machinery and mechanical equipment, including the following, when imported unassembled, to have required indication of the country of origin *on the principal part of each machine or complete equipment, or on the name plate.* Pump machinery, cast-iron heating boilers, water-tube boilers, chain hoists, coal conveyors.

METALLIC GOODS. *When not exempt under Section* 18 (*)

Caps, covers, lids (metallic), aluminum covers for jars, tinfoil disk lids, when imported for use on bottles, jars, or containers intended to be filled with products of Canadian manufacture—*exempt from marking under the provisions of Section* 18 (*)

* Copies of Sections 11 and 18 can be procured from Bureau of Foreign and Domestic Commerce, Washington, D. C.

A. C. S. Convention Plans

Advance information has been issued concerning the program and plans of the 24th Annual Convention of American Ceramic Society, to be held at St. Louis, Mo., February 27 to March 3, inclusive, and everything indicates a most interesting and instructive meeting. The Hotel Statler will be headquarters and members are advised to make their reservations at once. A number of papers of particular interest to glass men are already announced, and more will follow.

A. C. S. Plans for English Trip

Dr. E. Ward Tillotson of the committee on arrangements for the proposed trip to England next summer, when the Glass Division of the American Ceramic Society will return the visit of the Society of Glass Technology to this country in 1920, has issued a schedule of passage rates and forwarded a questionnaire to all members who have manifested a desire to make the trip, asking for their views as to the preferred sailing date, route to be followed, extent of the trip, etc. Dr. Turner, secretary of the Society of Glass Technology advises making the trip either in June, early in July, or after September 1st.

All members who expect to join the party were requested to fill in and return the questionnaire immediately. Other eligible glass men who would like to make the trip, which will include a tour of British glass factories, should get in touch with Dr. Tillotson, at the Mellon Institute, Pittsburgh, Pa., regarding the plans and make arrangements to join the Society at once.

Short Course in Ceramic Engineering

The regular biennial two weeks short course in Ceramic Engineering will be given at the University of Illinois, between the dates of January 23 and February 4, 1922. The subjects covered will include elementary physics and chemistry; the origin, classification, winning and refining, and testing of clays; the shaping, drying and burning of clay products; bodies and glazes; the technology of glass; refractories and refractory products; kiln construction; coal and gas fuels; engines and boilers, dynamos and motors; equipment control; pyrometry; drafting and reading of drawings; and business law.

The complete program is ready for distribution and copies may be secured by addressing the Department of Ceramic Engineering, University of Illinois, Urbana, Illinois. The course is open to all who are interested and can be taken to advantage by any one having a common school education. There are no tuition fees.

Monthly Summary of Imports and Exports

Exports of all kinds of glass and glassware in October, 1921, as shown by the Monthly Summary of Foreign Commerce, totaled in value $682,262, equal to about 28% of the exports in October, 1920, which were $2,443,386. For the ten months ending October, 1921, exports totaled $12,859,176 compared with $24,223,212, and $20,851,652 for the corresponding periods in 1920 and 1919 respectively.

Imports in October, 1921, were $961,035, compared with $1,166,099 in October, 1920. For the ten months ending October, 1921, imports totaled $8,946,649, while for the corresponding periods in 1920 and 1919 they amounted, respectively, to $6,416,923 and $1,546,045.

In November, 1921, exports of all kinds of glass and glassware were $699,218, a heavy drop from November, 1920, when they amounted to $2,811,459. For the eleven months ending November, 1921, the total exports were $13,558,394, compared with $27,034,671 in 1920 and $22,879,839 in 1919.

Imports in November 1921, were $947,957, against $1,164,320 in November, 1920. For the eleven months ending November, 1921, the total imports were $9,894,606, compared with $7,581,243 in 1920, and $1,851,423 in 1919.

Who Wants $100.00

THE NATIONAL COUNCIL OF LIGHTING FIXTURE MANUFACTURERS has decided to offer prizes for a suitable slogan—one that will be short, full of "pep" and expressive of the far-reaching benefits that progress in the lighting industry confer on the human race.

The lighting fixture industry is comparatively new. It has had a wonderfully rapid growth. Few people have ever stopped to visualize just what this great industry means to the home, social and business life of the country. What is needed therefore, is a slogan which will tell the story in a few well-chosen words.

As examples of clever, useful and successful slogans the council cites that of the paint manufacturers: "Save the surface and you save all", and the florists' "Say it with Flowers".

The prize for the accepted slogan is $100.00 and there will be a second prize of $50.00 and five prizes of $10.00 each. Contestants should send their entries to the "Slogan Committee" at the National Council's office, Cleveland, Ohio. The winner will be announced at the Milwaukee convention in February.

Night School Course on Artificial Lighting

A course of free instruction on Artificial Lighting will be held this Winter at the Murray Hill Evening Trade School, New York City.

Those interested in lighting and lighting glassware who desire to attend should write F. J. McGuire at the school, 237 East 37th street, New York.

Personal Items

PAUL A. HUGHES, for many years connected with the trade, latterly with the Johnston Brokerage Company at Pittsburgh, Pa., has become secretary of the Publicity Bureau of the Plate Glass Manufacturers' Association.

The Mellon Institute of Industrial Research, Pittsburgh, Pa., announces the appointment of MAURICE C. WALSH, as the incumbent of the Container Club's Industrial Fellowship in the Institute. Mr. Walsh succeeds, J. D. MALCOLMSON, who is now connected with the Robert Gair Company, New York City.

Recent Deaths

JAMES H. DAVIS, a pioneer of the glass industry on the Pacific Coast and secretary of the Pacific Coast Glass Works, San Francisco, Cal., died on November 30.

RICHARD T. CONLEY, Mount Vernon, N. Y., general manager of the eastern branch of the Pittsburgh Plate Glass Company, Pittsburgh, Pa., died December 23, following an attack of indigestion. Mr. Conley was 35 years of age.

CHARLES P. PRAITSCHING, for the past nine years connected with Shapiro & Aronson, Inc., manufacturers of lighting fixtures, New York, as salesman covering the New England states and part of New York, died on December 15.

Coming Meetings and Other Events

AMERICAN CERAMIC SOCIETY.—Twenty-first annual meeting at St. Louis, Mo., February 27 to March 3, 1922.

AMERICAN SOCIETY FOR TESTING MATERIALS.—1922 annual meeting, Atlantic City, latter part of June, 1922.

LIGHTING FIXTURE MARKET and JOINT CONVENTION of the National Council of Lighting Fixture Manufacturers, Lighting Fixture Dealers' Society of America, and the Illuminating Glassware Guild, Milwaukee, Wis. January 30 to February 4, 1922.

News of the Trade

THE GLASS INDUSTRY will be glad to receive notices of new glass manufacturing projects, plant extensions, removals, personal items, etc.

THE KNOXVILLE GLASS COMPANY has arranged for the construction of a one-story building, 90 by 100 feet, for the manufacture of mirrors.

According to a press report the building and contents of the engine room of the OBEAR-NESTER GLASS COMPANY, St. Louis, Mo., were destroyed by fire on December 16th. The damage was estimated at $50,000.

It is reported that T. H. Broyhill and F. H. Coffey, of Lenoir, N. C., are organizing a new company with a capital of $200,000 for the establishment of a plant for the manufacture of mirrors and other glassware products.

A press report states that the improvements at the Okmulgee, Okla., plant of the INTERSTATE GLASS COMPANY, which were scheduled to begin January 2, are under way. It is estimated that the improvements will cost about $100,000.

A press report states that THE CRYSTAL GLASS COMPANY, Ninth and O Streets, Fort Smith, Ark., is planning for the remodeling of its plant, with extensions and improvements estimated to cost about $75,000. C. P. Zenor is head of the company.

THE GREENSBERG BOTTLE COMPANY, Newark, N. J., has been organized with a capital of $50,000 by Samuel B. Ferster, Wesley B. King and H. W. Brams, 800 Broad Street, Newark, N. J. The report states that the company will manufacture bottles.

THE MIDWEST GLASS PRODUCTS CORPORATION, 112 South Michigan Avenue, Chicago, Ill., according to a press report, has been organized with a capital of $500,000 to manufacture and deal in glass products.

W. BLENKO, of Lancaster, Ohio, recently purchased property at Huntington, W. Va., and will erect a plant for the manufacture of colored antique glass for use in memorial windows. Mr. Blenko states that it is expected that the plant will be in operation by March 15, 1922.

THE DAVIES GLASS MANUFACTURING COMPANY, Martins Ferry, Ohio, announce that they expect the new glass plant which they are erecting to be ready for operation about March 1, 1922. The company will manufacture a complete line of illuminating glassware.

Fire which occurred on December 7, at the plant of the SCHRAM GLASS MANUFACTURING COMPANY, Hillsboro, Ill., according to X. G. Buehler, secretary, damaged the lehrs to such an extent that the company was forced to shut down the furnaces until the lehrs and burned portion of the plant could be replaced.

THE SALEM FLINT GLASS COMPANY, Salem, W. Va., was recently incorporated with a capital of $10,000 by H. L. Bee, B. S. Bischoff, and F. R. Davis, all of Salem. The company will manufacture globes and other glass specialties and is now installing glass-manufacturing equipment in an existing building.

THE HEINEMANN & MOSCH GLASS & MIRROR COMPANY, Newark, N. J., according to a press report has been incorporated with a capital of $50,000 to manufacture glass products, mirrors, etc. The incorporators are Otto Heinemann, Joseph Mosch and Frank Prasch. The company is represented by Howard Ishewood, 738 Broad Street, Newark.

THE INDUSTRIAL GLASS MANUFACTURING COMPANY, Cameron, W. Va., according to W. J. Wambaugh, president, was organized to succeed the Industrial Glass Company of Cameron and Morgantown, W. Va. The former company manufactured blown tumblers, but the new company will manufacture other lines of glass products and will also add to the equipment of the factory.

W. H. Johnson, general manager, AUTOMATIC MACHINERY COMPANY, Terre Haute, Ind., who visited Pittsburgh and New York recently, closed a large contract with L. F. Rigolleau of South America, for conveyors and automatic lehr feeders. The Automatic company is installing equipment at the Atlas factory of the Hazel-Atlas Glass Company, Washington, Pa., and recent installations have been made at Richard Cooper & Company, Portobello, Scotland, and Vidriera Andalusia, Seville, Spain. The company reports that prospects for future business are exceptionally bright, a good demand for its improved lehr feeding equipment being well-sustained.

Foreign Trade Opportunities

Further particulars may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C.

213. The purchasing agent for firms in Cuba is in the United States and desires to buy, and secure an agency from manufacturers for the sale of bottles and chemicals. No reference offered.

224. A commercial agent in Bulgaria desires to secure an agency for the sale of glass and porcelain ware. Quotations should be given c. i. f. Bulgarian ports or Constantinople. References.

438 An importing firm in China desires to secure the representation of American exporters for the sale of glass, etc. Samples or a small consignment of goods are requested. Payment to be on basis of outright purchase against letters of credit. No reference offered.

440 A merchant in Denmark desires to purchase a large quantity of polished plate glass of glazing quality, one-quarter to five-sixteenths inch thick. Quotations should be given f. o. b. New York. Reference.

Inquiries Received

For further particulars address THE GLASS INDUSTRY.

44. Please give us the names of manufacturers of bottle making machinery.

45. Do you know whether or not glass decorating kilns have been developed making use of electric current?

46. Is there a school in New York City where one can learn the commercial art of decorating glass, or can you refer me to any one who can give instruction in this art?

47. Please advise where we can get "white opal glass" water basins and fittings, etc., as used by manufacturers of medical and dental equipment.

48. (From Belgium). Please send us the addresses of factories making ground glass stoppers.

49. Kindly tell us who makes the "Golden State" brand of preserving jar.

50. Please put us in touch with a glass factory which can make pressed glass standards for clocks, size about 1¼ inches square or round and about 6 inches long, notched at the ends so that they can be cemented into the base and upper fittings.

51. Please give us the names of concerns near Charleroi, Pa., that will split and flatten cylinders of special glass which we will provide.

Current Prices of Glass-Making Materials

From quotations furnished by various manufacturers and dealers

December 27, 1921

	Carlots	Less Carlots
Alumina hydrate .....lb.	.05½	.06
Arsenic trioxide (dense white, 99%) .....lb.	.05¾–.07½	
Barium carbonate .....ton	46.00	55.00
Bone ash .....lb.	.04	.04½
Borax .....lb.	.05¼–.05½	.05½–.06
Borax, fused, any mesh .....lb.	.19	.20
Boric acid, fused .....lb.	.35	.35
Cadmium Sulphite, red or orange. lb.		1.35
Cadmium Sulphide, yellow .....lb.		1.35
Cobalt oxide .....bbls. lb.		2.00
Cobalt oxide .....10 lb. tins, lb.		2.10
Copper oxide, red .....lb.		.17 –.20
Copper oxide, black .....lb.	.23	.26
Copper oxide, black, prep'ed, ...lb.		.30
Cryolite .....lb.		.10
Feldspar, 100 mesh.....ton.	18.00	
Fluorspar, powdered white, 90% .....ton	38.00	
Kaolin .....ton	17.00	25.00
Lead oxide (red lead, Pb_3O_4)...lb.	.08	.08¼
Litharge (PbO) .....lb.	.07½	.07¾
Lime—		
Hydrated .....ton	45.00	
Burnt, ground, in bulk.....ton	7.50	
Burnt, ground, in paper sacks. ton	9.50	
Burnt, ground, in 280 lb. bbls. per bbl.		2.05
Manganese (85% MnO_2).....lb.	.03½	.04 –.06½
Nickel Oxide (NiO) black .....lb.	.45	.50
Nickel Oxide (Ni_2O) green .....lb.	.35	.40
Potassium carbonate—		
Calcined 90% .....lb.	.06	.07
Hydrated 90% .....lb.	.05½	.06
Potassium nitrate .....lb.	.09½	.09¾
Powdered blue .....lb.		.24 –.26
Powdered blue (std. formula) ..lb.		.38
Salt cake, for glassmakers.....ton	18.00	.01½–.02 lb.
Selenium .....lb.		1.95–2.25
Soda ash, 58% dense, 48% basis		
Bulk .....100 lb.	1.47½	1.55
Bulk, on contract .....100 lb.	1.42½	
Sodium nitrate, refined.....lb.	.06⅛	.06¾
Sodium selenite .....lb.		2.25
Sulphur (flowers) .....lb.	.02¼	.02¾
Sulphur (flour, heavy) .....lb.	.02	.02¼
Uranium Oxide—100 lb lots.....lb.	2.10	2.25
Zinc oxide (ZnO) .....lb.	.07	.08½

Stock Quotations

Reported by Moore, Leonard & Lynch, Frick Building, Pittsburgh, Pa.

Pittsburgh Stock Exchange—December 27, 1921

	Bid	Asked	Last
American Window Glass Machine common	66	68	67
American Window Glass Machine pfd....	83¼	85	83¼
American Window Glass preferred.....	95	97	98
Pittsburgh Plate Glass	126	131	127½
U. S. Glass	47	49	40

Market dull with weakness in American Window Glass Machine common since last report; the preferred selling ex-dividend remains the same. The last sale of U. S. Glass on the Pittsburgh Stock Exchange was 40 on the 14th of November. Forty-seven is now bid for the stock with none offered under 49. This reflects the improved condition in the glass business generally.

Wheeling Stock Exchange—December 27, 1921

	Bid	Asked	Last
Hazel Atlas Glass	138	140	139
Fostoria Glass	115	...	112
Central Glass	145	154	154
Imperial Glass	95	100	100

Leading glass shares on the Wheeling Stock Exchange have been dull with few transactions. Imperial paid 1¼ per cent extra Christmas dividend making 2½ per cent for the month. Bookings for the first six months of 1922 at the Hazel are reported as being heavy.

Toledo Stock Exchange—December 27, 1921

	Bid	Asked	Last
Owens Bottle Machine common.....	25½	26	26
Owens Bottle Machine preferred.....	94	98	97
Libbey-Owens Sheet Glass common.....	105	110	110
Libbey-Owens Sheet Glass preferred.....	95	100	97

Market dull with silght recessions.

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